

# Physico-Chemical and Microbiological Profile of Wine Lees of Red Wines from Local Grapes Varieties

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## Abstract

In the Republic of Moldova, the viticulture industry is a sector with a high economic impact, and the utilization of secondary products from winemaking represents a growing concern regarding environmental sustainability. Wine lees, one of the types of wine waste, is less studied in order to valorize it. Currently it is used in the production of ethyl alcohol, as aggregates in the soil and others. The aim of this study was to characterize from a physico-chemical and microbiological point of view the lees sediments obtained after the primary fermentation of three types of individualized red wines made from autochthonous grapes varieties. It was found that residual yeasts represent a valuable raw material containing carbohydrates (from  $14.35\% \pm 0.19\%$  to  $25.11\% \pm 1.51\%$  SU), lipids (from  $4.61\% \pm 0.21\%$  to  $9.41\% \pm 2.04\%$  SU), proteins (from  $42.62\% \pm 1.57\%$  to  $77.62\% \pm 9.14\%$  SU), anthocyanins (from  $9.18 \pm 0.15$  to  $22.78 \pm 1.60$  mg cyanid) and beta-glucans (from  $12.84\% \pm 0.01\%$  to  $17.42\% \pm 0.02\%$ ). The pH value of wine lees ranges from  $3.49 \pm 0.0$  to  $3.083 \pm 0.01$ , the dry matter from  $9.62\% \pm 0.22\%$  to  $25.06\% \pm 0.42\%$  and the ash from  $0.03\% \pm 0.42\%$  to  $0.035\% \pm 0.21\%$ . The microbiological study confirmed the presence of live yeasts of the genus *Saccharomyces cerevisiae*, which remain active due to the presence of residual sugars and oxygen. The results of the research are promising and encourage the obtaining of new products with special purpose and added value.

## Keywords

Red Wines, Wine Lees, Yeasts, By-Products, Winemaking

# Wine Physic

**Percy H. Dougherty**



## **Wine Physic:**

*Wine Science* Ronald S. Jackson, 2008-04-30 *Wine Science* Third Edition covers the three pillars of wine science grape culture wine production and sensory evaluation It takes readers on a scientific tour into the world of wine by detailing the latest discoveries in this exciting industry From grape anatomy to wine and health this book includes coverage of material not found in other enology or viticulture texts including details on cork and oak specialized wine making procedures and historical origins of procedures Author Ronald Jackson uniquely breaks down sophisticated techniques allowing the reader to easily understand wine science processes This updated edition covers the chemistry of red wine color origin of grape varieties wine language significance of color and other biasing factors to wine perception various meanings and significance of wine oxidation It includes significant additional coverage on brandy and ice wine production as well as new illustrations and color photos This book is recommended for grape growers fermentation technologists students of enology and viticulture enologists and viticulturalists NEW to this edition Extensive revision and additions on chemistry of red wine color origin of grape varieties wine language significance of color and other biasing factors to wine perception various meanings and significance of wine oxidation Significant additional coverage on brandy and ice wine production New illustrations and color photos

Science and Technology of Fruit Wine Production Maria R. Kosseva, V.K. Joshi, Parmjit S. Panesar, 2016-11-01 *Science and Technology of Fruit Wine Production* includes introductory chapters on the production of wine from fruits other than grapes including their composition chemistry role quality of raw material medicinal values quality factors bioreactor technology production optimization standardization preservation and evaluation of different wines specialty wines and brandies Wine and its related products have been consumed since ancient times not only for stimulatory and healthful properties but also as an important adjunct to the human diet by increasing satisfaction and contributing to the relaxation necessary for proper digestion and absorption of food Most wines are produced from grapes throughout the world however fruits other than grapes including apple plum peach pear berries cherries currants apricot and many others can also be profitably utilized in the production of wines The major problems in wine production however arise from the difficulty in extracting the sugar from the pulp of some of the fruits or finding that the juices obtained lack in the requisite sugar contents have higher acidity more anthocyanins or have poor fermentability The book demonstrates that the application of enzymes in juice extraction bioreactor technology and biological de acidification MLF bacteria or de acidifying yeast like *Schizosaccharomyces pombe* and others in wine production from non grape fruits needs serious consideration Focuses on producing non grape wines highlighting their flavor taste and other quality attributes including their antioxidant properties Provides a single volume resource that consolidates the research findings and developed technology employed to make wines from non grape fruits Explores options for reducing post harvest losses which are especially high in developing countries Stimulates research and development efforts in non grape wines

**Concise Encyclopedia of Science and Technology of**

**Wine** V. K. Joshi, 2021-07-21 When asking the question what is wine there are various ways to answer Wine is extolled as a food a social lubricant an antimicrobial and antioxidant and a product of immense economic significance But there is more to it than that When did humans first start producing wine and what are its different varieties Are wines nutritious or have any therapeutic values do they have any role in health or are they simply intoxicating beverages How are their qualities determined or marketed and how are these associated with tourism Concise Encyclopedia of Science and Technology of Wine attempts to answer all these questions and more This book reveals state of the art technology of winemaking describing various wine regions of the world and different cultivars used in winemaking It examines microbiology biochemistry and engineering in the context of wine production The sensory qualities of wine and brandy are explored and the composition nutritive and therapeutic values and toxicity are summarized Selected references at the end of each chapter provide ample opportunity for additional study Key Features Elaborates on the recent trends of control and modeling of wine and the techniques used in the production of different wines and brandies Focuses on the application of biotechnology especially genetic engineering of yeast bioreactor technological concepts enzymology microbiology killer yeast stuck and sluggish fermentation etc Illustrates the biochemical basis of wine production including malolactic fermentation Examines marketing tourism and the present status of the wine industry Concise Encyclopedia of Science and Technology of Wine contains the most comprehensive yet still succinct collection of information on the science and technology of winemaking With 45 chapters contributed by leading experts in their fields it is an indispensable treatise offering extensive details of the processes of winemaking The book is an incomparable resource for oenologists food scientists biotechnologists postharvest technologists biochemists fermentation technologists nutritionists chemical engineers microbiologists toxicologists organic chemists and the undergraduate and postgraduate students of these disciplines **The Science of Wine** Jamie

Goode, 2021-06-08 An up to the moment new edition of Jamie Goode s celebrated wine science book A thoroughly revised and updated third edition of this essential and groundbreaking reference gives a comprehensive overview of one of the most fascinating important and controversial trends in the world of wine the scientific and technological innovations that are now influencing how grapes are grown and how wine is made Jamie Goode an authority on wine science details the key scientific developments relating to viticulture and enology explains the practical application of science to techniques that are used around the world and explores how these issues are affecting the quality flavor and perception of wine The only complete and accessibly written resource available on the subject The Science of Wine engagingly discusses a wide range of topics including terroir the influence of soils on wine flavor breeding new resistant grape varieties the effects of climate change on grape growing the role of yeasts and bacteria in winemaking and much more A must have reference for a wide audience of students winemakers wine professionals and general readers interested in the science of wine **Uncorked: Negotiating**

**Science and Belief in the Natural Wine Movement** Pablo Alonso González, Eva Parga Dans, 2025-06-28 Natural wine is a

captivating and rapidly evolving phenomenon in the world of viticulture and winemaking. This movement, characterized by minimal intervention, low or no chemical additives, and a focus on terroir-driven expressions of grapes, has ignited a passionate following among wine enthusiasts, sommeliers, and eco-conscious consumers. It's more than just a beverage; it embodies a philosophy that aligns with contemporary sustainability and wellness trends. Though natural wine enthusiasts have produced ample coverage of the natural wine movement in books, essays, and films, academics have lagged behind in their examination of this global phenomenon. In *Uncorked: Negotiating Science and Belief in the Natural Wine Movement*, scholarly discussion reaches across disciplines to offer valuable insights for researchers, producers, wine enthusiasts, and anyone with an interest in this movement. Exploring the relevance of natural wine offers a unique lens through which to examine the intersection of tradition, innovation, environmental stewardship, and the evolving tastes of modern consumers. Through the stories of the winemakers, the science behind natural fermentation, and the cultural and historical context, this book aims to provide a comprehensive look at how this movement is shaping the future of wine and our relationship with the natural world. Each essay from a thought leader in their respective field delves deep into the historical, ecological, and sociocultural dimensions of natural winemaking, shedding light on its ancient roots, ecological practices, and the philosophical underpinnings that drive the movement. Discussions of regulatory and consumer aspects will also elucidate the practical considerations of making and selling natural wine. *Uncorked: Negotiating Science and Belief in the Natural Wine Movement* is a groundbreaking edited book that offers a comprehensive and scholarly exploration of the world of natural wine. This interdisciplinary volume brings together leading experts in fields ranging from enology and sensory studies to anthropology and philosophy, creating a rich tapestry of insights into the production, consumption, and cultural significance of natural wine. Academics, winemakers, and wine enthusiasts alike will be illuminated by this volume.

[Uncorking the Physics of Wine](#) Lutz Kasper, Patrik Vogt, 2024-06-26. A still-sealed wine bottle, a corkscrew, and a smartphone are undoubtedly a promising combination. Notify good friends with one device and extract the cork from the bottle with the other: what more could one want? Perhaps, in addition to quenching the thirst, the mind also craves satisfaction. With this book, you practice your physics mindfulness during the enjoyment of wine; you learn how to determine the speed of sound with the characteristic pop sound when opening the bottle, how to properly decant wine, what peculiarities red wine shows in laser light, and what Pythagoras has to do with wine. *Uncorking the Physics of Wine* creates the wonderful connection between science and wine. An inspiring non-fiction book with experiments to participate in and replicate or simply to savor. The authors, Lutz Kasper, studied physics and mathematics at the University of Hannover to become a teacher and completed his doctorate in physics education at the University of Potsdam. He has been a professor of physics and physics education at the University of Education Schwabisch Gmünd since 2011. In recent years, he also has worked as an invited visiting professor in the physics department of Grand Valley State University, MI, and at the Taraz Pedagogical University, Kazakhstan. Patrik Vogt studied physics and mathematics on a

teaching degree at the University of Koblenz Landau and was a research assistant and secondary school teacher at various schools and universities in Germany until 2019 Since then he is head of the department Media Education Mathematics Natural Sciences Music Philosophy at the ILF in Mainz Germany His work focuses on the possible uses of mobile devices in physics lessons especially as a measuring instrument task culture and the physics of everyday life

*The Geography of Wine*  
Percy H. Dougherty, 2012-01-02 Wine has been described as a window into places cultures and times Geographers have studied wine since the time of the early Greeks and Romans when viticulturalists realized that the same grape grown in different geographic regions produced wine with differing olfactory and taste characteristics This book based on research presented to the Wine Specialty Group of the Association of American Geographers shows just how far the relationship has come since the time of Bacchus and Dionysus Geographers have technical input into the wine industry with exciting new research tackling subjects such as the impact of climate change on grape production to the use of remote sensing and Geographical Information Systems for improving the quality of crops This book explores the interdisciplinary connections and science behind world viticulture Chapters cover a wide range of topics from the way in which landforms and soil affect wine production to the climatic aberration of the Niagara wine industry to the social and structural challenges in reshaping the South African wine industry after the fall of apartheid The fundamentals are detailed too with a comparative analysis of Bordeaux and Burgundy and chapters on the geography of wine and the meaning of the term terroir

**Wine Science**  
Ronald S. Jackson, 2000-05-03 The second edition of Wine Science Principles Practice Perception updates the reader with current processes and methods of wine science including an analysis of the advantages and disadvantages of various new grape cultivar clones wine yeast strains and malolactic bacteria It also addresses current research in wine consumption as related to health The many added beautiful color photographs graphs and charts help to make the sophisticated techniques described easily understandable This book is an essential part of a any library Key Features Univerally appealing to non technologists and technologists alike Includes section on Wine and Health which covers the effects of wine consumption on cardiovascular diseases headaches and age related macular degeneration Covers sophisticated techniques in a clear easily understood manner Presents a balance between the objective science of wine chemistry and the subjective study of wine appreciation Provides updated information involving advantages disadvantages of various grape cultivar clones wine yeast strains and malolactic bacteria Chapter on recent historical findings regarding the origin of wine and wine making processes

*Science* John Michels (Journalist), 1886 Vols for 1911 13 contain the Proceedings of the Helminothological Society of Washington ISSN 0018 0120 1st 15th meeting

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## Whispering the Secrets of Language: An Emotional Quest through **Wine Physic**

In a digitally-driven earth where screens reign great and quick communication drowns out the subtleties of language, the profound secrets and emotional subtleties concealed within phrases often go unheard. However, set within the pages of **Wine Physic** a interesting literary value blinking with organic emotions, lies an extraordinary quest waiting to be undertaken. Composed by a skilled wordsmith, this charming opus invites viewers on an introspective trip, softly unraveling the veiled truths and profound impact resonating within the very material of every word. Within the psychological depths of this poignant review, we can embark upon a heartfelt exploration of the book is key styles, dissect its fascinating publishing fashion, and succumb to the powerful resonance it evokes heavy within the recesses of readers hearts.

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web you sack including use these symbols to represent bushes and other public plant types such as clematis hardy ferns roses hibiscus etc below are some landscape plant symbols like evergreen tree symbols deciduous tree symbols shrub notation flower symbols and ornamental grass symbols

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web garden symbols are used in a garden design the garden designs are for the backyard garden flower garden vegetable garden and more garden plans all the designs are created to embellish your garden area it is done for private buildings public buildings parks and recreational areas

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web 1 how to create a garden design in word in order to create a garden design in ms word you will need to follow the following lengthy steps plan when you are making a garden design online it is better to make a plan by listing the plants that are already in the area you make another list of plants that you are willing to plant

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web rhs level 3 garden planning r3111 graphic symbols garden designers use graphic symbols to show elements such as plants and hard landscaping on a garden plan different symbols are used to indicate types of plants such as shrubs evergreen trees deciduous trees and groundcover

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web 1 using a circle template pictured draw your plants using circles don t be afraid to overlap the circles a bit so in real life your plants form a mass 2 use a felt tip marker to outline the outside edge of the group with whatever plant edge you d like see some examples above don t ink the lines that overlap

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web get started login to enroll up to now we have discussed principles and techniques for evaluating your site designing gardens and selecting plants in this module we take up the process of actually creating your garden the following steps should get you started determine the conditions in your garden site by doing site analysis

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web drawing plant symbols in plan view is a great way to step into garden graphics it starts with a circle then you can embellish it as you wish though simplicity overall is always good

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web symbolic garden design the alhambra in granada which is based on islamic gardening principles look around most of our own gardens today and you re unlikely to find much symbolism in fact since around 1700 gardens in europe have been largely devoid of allegory and metaphor

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web the landscape symbols help you create beautiful landscape plans for your house or building we use these symbols to depict the plants and other materials in the design to create a healthy landscape that showcases natural beauty here are the most commonly used landscape symbols and their benefits

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web oct 29 2010 garden design symbols are very easy to draw names of plants may be added to the side of the drawing with a line showing which plant you re indicating john says there are lots of books available to help you develop a vocabulary of symbols

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web unlike other tools that require expertise edrawmax comes with several easy to understand online resources it is considered the all in one diagramming tool well equipped with garden design symbols these garden symbols are in vector format which is scalable and flexible with edrawmax the garden plans can easily be resized recolored and

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web jan 26 2022 purple and yellow are complementary colors that work together to make each color stand out but any color pairing you love would work keep the plants low and loose to soften the geometric shapes of hardscaping such as the patio lawn and pathway continue to 2 of 15 below 02 of 15

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web creating garden design softwares is a breeze quick and easy edrawmax garden design software is easy to use with drag and drop features loads of symbols intelligent adjustment and various toolkits it is developed for both designers and non designers visualize every detail visualize everything including plants trees grass lights

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web landscape symbol examples below are common design symbols used for different types of plant material remember that you don t have to create perfectly stylized symbols basic circles or a freehand drawing can be all that you need